INFORMATION AND COMMUNICATION TECHNOLOGY IN LOGISTIC PROCESSES OF THE COMPANIES

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1. INTRODUCTION

The aim of this work is to study how the new information and communication technology (ICT) influence in logistics processes of companies and to know the effects they produce on them. It is of great importance in the degree of Business Administration to know the technological development that is taking place in today's society, so that from the business world we know how to adopt those best suited technologies to our business and manage to get improvements and benefits, achieving profitability and competitiveness in the market we work. Thus, we have focused on the logistics companies' process, since it is an important phase in the management of the company that serves as a link between production and the market, and is responsible for placing products in the right place, at the right time and under the conditions desired by the customer.

The customer is always the last agent of the supply chain, but the most important one, so the logistics activity is also important within companies, this importance is given by the need to improve customer service, attention and satisfaction. And even nowadays, the customer demands for faster product use, so that the availability of products is an increasingly important differentiating characteristic. This requires that supply chains are increasingly efficient, fast and the fact that they adapt to the product or service the company sells.

As stated by CYBERSUDO (2010, p.7):

> *The life cycle of products is shrinking more and more, so that organizations face increasingly tighter deadlines, with all the implications of supply, transportation, inventory management, that this fact entails. Being able to meet customer expectations, deciding according to the objectives of the company's level of service to each customer, it is the responsibility of the management of the supply chain.*

As Iglesias points out (2016):

> *The level of customer service is directly related to the effectiveness of management and logistics management of all channel members: information*

flows, materials, products, etc. The more effective, the greater added value will be incorporated to the customer service.

To carry out this study, we propose, first, know the meaning of logistics management and its importance to enhance competition in the market in which the company operates. Secondly, it aims to deal with Information Technology and Communication (ICT), explaining its fast development and how it has led to changes in several areas of our society, especially how in the logistics sector this development has affected businesses so that they adapt to the new competitive environment arising from ICT development.

In the third place, it is explained how to make ICTs improve efficiency, the control and management of goods from production to their final consumption. To do so, it is studied how this has influenced the introduction of new technologies at every stage of the logistics activity in order to optimize the supply chain.

Finally, it will be pointed out some significant examples of companies using ICT in their logistics process have managed to differentiate themselves from competing companies and be leaders in costs. To do this, we will know what strategies they use and how they do it.

2. LOGISTICS MANAGEMENT

Logistics management is integrated within the overall management of the company, it deals with the process of planning, operation and control of the movement and storage of goods, as well as services and the associated flow of information, with the purpose of managing the products from origin to delivery to the final consumer.

As FUNDETEC exposed (2008, p.17) logistics is "*the science (and art) that the required products reach the place provided in adequate quantity and conditions and at the right time to meet market demands".*

Logistics is increasingly important for companies as it is a strategy for them, and it also is becoming an important factor to improve competition in a constantly changing market (Anaya, 2000).

From the 1950s and 1960s, logistics begins to be seen as an area of individualized management within the company, appearing as one of the activities where companies can achieve significant improvements in productivity.

So far logistics has been considered in its broadest sense, ranging from the functions of supply of raw materials and components needed for production; the location and movement of materials in production plants, location of storage, transport and distribution of products to customers, etc. (Casares, 2005).

As it is claimed (Urzelai- Inza 2006, p.2):

> *The Council of Logistics Management defines logistics as the part of the management process of the supply chain responsible for planning, implementing and monitoring an efficient and effective storage and forward and reverse flow of goods, services and all information related to these, between the point of origin and the point of consumption in order to meet consumer expectations.*

To optimally manage logistics it is necessary to integrate it among all companies in the supply channel, including the customers themselves, with the objective to be able to improve joint processes and offer greater value to the end consumer (Servera-French, 2011).

The concept of integration of logistics activities along the channel is not really new (Tesler, 2010), and in the early eighties the need to integrate the activities was addressed. Nevertheless, the difference is that currently there are available informatio and communication technologies essential to make this integration in an effective and agile way.

One of the main problems of logistics management is the loss of control over the goods from the time when leaving the warehouse or logistics center until they reach their destination. With the use of a specialized software, companies reduce as much as possible any errors in the distribution chain.

To do this with a proper traceability of the product, in other words, with a definition of the steps that a product takes, from its source to its final delivery, a number of benefits for the companies is provided, since, accurate information on the location of a product is generated.

Currently, all these functions may be included in an ERP system (Enterprise Resource Planning), offering companies a number of advantages, as the business management system is fully integrated and can share information easily through the different departments of an organization.

Efficiency and productivity of a company improve, but monitoring and forecasts improve as well, even customer service.

This system gives the possibility to offer an immediate response to customers' demand, through an efficient interaction with the logistics and financial department, allowing to respond adequately to strict deadlines and production requirements based on stock and inventory optimization.

The challenge that companies face today is competition in the logistics sector, companies face increasingly severe pressure due to the need to improve customer service, seeking to cut costs but this may lead to a decrease of product quality. Therefore, the way to deal with this situation is to obtain improvements in the supply chain of companies, through the implementation of new measures in the processes and activities of the organization.

According to CYBERSUDO (2010, p.5), *"One of the main objectives of all companies is to find the way to shorten this chain and reduce its volume".*

3. ICTs

In mid-2004 it can already be said that information and telecommunications technologies have lost the adjective new. Their novelty answered that their introduction had unleashed a wide range of innovation processes. Their widespread

implementation has transformed virtually all economic, agricultural, industrial sectors, and especially, services.

In recent years, new information and communication technologies, ICT have strongly penetrated in society, resulting in a short period of time with many changes: lifestyle, consumption patterns and the relationship between individuals, businesses or public administration, the organization of production, product distribution, information or knowledge. For this reason, this set of changes has been renamed *technological revolution*, characterized by the speed in which changes have taken place and the speed of its spread around the globe.

The increasing incorporation of ICT in all areas both social and economic has contributed to the development of information society, described by many authors as the Revolution of the 21st century (Berumen and Arriaza, 2008).

Nowadays, society is in a new stage of development in which production activities, dissemination and application of research, development and innovation are very important in the different sectors of the economy. Increasingly, ICT allow the replacement of work activities that do not require high training. To access or keep the job, many issues are required, namely, mastering tools, knowledge of some basic languages, mobility, ability to attend or organize meetings, these are some of the features that are indispensable to show that society has progressed.

As Berumen and Arriaza (2008, p.36) state:

> *The fundamentals of this development are manifold. Firstly, a technological revolution, led by investment and massive use of information and communication technology (ICT). Secondly, a dynamic temporal and spatial extension of factor markets and products, or the globalization process. And, thirdly, a new pattern of demand patterns of consumption and investment of households and companies.*

ICTs enable and accelerate the construction of the so-called information society due to the fact that they make it possible the production and management of information on a large scale and low cost.

The rapid development of ICT, together with the reduction of international transport costs, has given way to the so-called process of globalization, an international integration of all markets which has changed the competitive environment as well as the scope of choice consumers. Since ICTs have made possible the process of the globalization of the economy, they can be considered one of the most important and fast technological revolutions in history. (Mas-Ivars and Quesada-Ibañez, 2005)

The members of the supply chain are under pressure to achieve efficiency, service and above all, to make their business profitable. Logistics operators are rapidly adopting the most appropriate technologies to their processes, to thereby achieve adapt to the new competitive environment.

We are facing a society in which citizens are increasingly concerned about health and food security, and where companies see as important the need for their business intelligence systems and ecological transport, in order to contribute to keep a sustainable climate and environment, as it is increasingly damaged.

ICTs therefore, affect the value chain of companies, improving the efficiency of different activities and allowing coordination of such activities (Berumen and Arriaza, 2008). But to take advantage of ICTs optimally, it is necessary that companies redesign their processes, learn to use them and adapt to the new situation, apart from make tangible and intangible investments in the company.

As exposed by Berumen and Arriaza (2008, p.27) *"ICTs have contributed to accelerate the process of economic exchange and to reduce communication costs, data storage and dissemination of information".*

4. LOGISTICS MANAGEMENT AND ICTs

Technological development applied to logistics operations is influenced by the evolution of new tools related to business intelligence, such as mobility tools or analysis and visualization of data, making it possible for companies to manage and monitor activities at any time or anywhere. In other words, business intelligence is the ability to transform data into information and information into knowledge as a way to optimize the decision-making process in companies.

As explained in *Análisis sectorial de implementación de las TIC en las pymes españolas* (FUNDETEC, 2010) the introduction of ICTs in logistics has enabled improvements in the management, control and constant monitoring of goods either at different times of storage or in various stages of transport, from the point of manufacture or origin to the point of final consumption.

This section is focused on reviewing the potential contribution of new technologies to improve the processes which are part of the logistics chain. According to the guide on ICT in the field of logistics and transportation in SMEs and micro SMEs (CYBERSUDO, 2010), ICTs lead to the increase of the efficiency and speed of the processes involved in logistics activities as well as minimize the possible errors during data processing, some of them of human origin.

Then, the various logistics activities and what technologies contribute to the optimization of the chain are described.

4.1. Supply management

Supply management is crucial to reach success in reducing the cost of the value chain (INSTITUTO ARAGONÉS DE FOMENTO, 2016).

This activity consists of selecting and managing the supplier of goods and services, negotiate prices and terms of purchase and the purchase of goods and quality services.

La guía sobre las TIC en el sector de la logística y transporte en la pyme y la micro pyme (CYBERSUDO, 2010), states that the fundamental role of suppliers is to lower purchasing costs, improve products' quality and reduce the stock and delivery times. In this logistics activity, the electronic exchange of information with trust relationships between suppliers and customers enable an auto billing from the consumption made, to develop automatic orders to suppliers, to join charging needs with the availability of carriers as well as to standardize the information through the same selection criteria.

To keep the planning of the whole supply chain of a company synchronized, it is used the so-called forecasting, that is to say, performing an estimation of future demand for a product, with the aim of improving the flow of the information in the supply chain and thereby, prepare the different areas of the company for future operations. The main benefits are:

- Improved availability, through the revision and the control of demand.
- Improved predictions.
- Control inventory levels to reduce the effects of peak demand.
- It complements the assessment of post-promotions.
- It improves the order fulfillment process by reducing the planning cycle.

4.2.Warehouse management

Warehouse management is a process within the logistics function of the company responsible for the reception, storage and movement within a warehouse to the point of consumption of any material, either raw materials, semi-finished products, finished products, or the handling and reporting of data generated (INSTITUTO ARAGONÉS DE FOMENTO, 2016).

The activities carried out in the warehouse management do not add value to the product, this facilitates the automation of processes. Currently, warehouse management is performed with the use of specific management systems. The Warehouse Management Systems (EMS) have experienced in recent years, a great evolution and acceptance in enterprises, one of the areas of logistics in which major advances and improvements have been achieved. Some of the advantages obtained by implementing these systems are:

- Higher profitability when preparing orders.
- Saving in labour.
- Reduced preparation cycles.
- High reliability.
- Inventory control.
- Space saving.

Among the various technologies involved in the implementation of SGA it may be mentioned, for example, codes of optical and magnetic bars, PCs onboard, radio frequency, portable terminals, EDI (Electronic Data Interchange), recognition of voice and integrated logistics management systems.

4.3. Stock Management

Inventory management is one of the fundamental activities within the management of the supply chain.

As INSTITUTO ARAGONÉS DE FOMENTO (2016) states:

> *The need for inventories is given by the difficulty of coordinating and managing over time the needs and requirements of customers with the production system and production needs with the ability of suppliers to supply the materials within the agreed time.*

The objectives of inventory management are on the one hand, to reduce to a minimum stock levels and to ensure the supply of the product (raw materials, work in progress or finished product) at the right time, whether it is the production area the company or the end customer. It is very important that companies ensure that whenever a customer requests a product, it will be provided.

On the other hand, it is very important the selection of suppliers by the company because it requires knowledge of some features, such as levels of quality, financial

solvency and the ability to meet delivery times, especially with the technical management of the so-called *Just in time (JIT)*, which is to receive the goods at the exact time when the company needs it.

In addition *JIT* not only it identifies with inventory management and reducing the need for safety stock. Nevertheless, it is based on the idea of getting rid of all waste, in other words, all tasks that do not add value to the product manufactured or to the service provided should be deleted. This system gives priority to customer satisfaction and their demand, which may influence how products are manufactured, processed and distributed.

4.4. Order management and distribution

Order management and distribution is considered as part of customer management, it consists on the implementation of activities arising from the completion of orders request, while the maximum value of the supply chain and customer's attention are ensured (INSTITUTO ARAGONÉS DE FOMENTO, 2016). This management process begins with the receipt of an order and ends when the order is submitted, accepted and finally cashed.

Transport becomes a key element in the logistics chain, although it involves a high cost for companies. The success of logistics chains is related to the design and proper use of the distribution system and transportation.

The importance of transport and distribution is due to the fact that this system distributes the finished products or raw materials between companies and customers which are located in different geographic locations. To put it differently, the goods move from the places where they get to where they are needed (Redacción España, 2016). Besides, if transported products are delivered on time, in the quantities desired by customers and they are not default, it allows you to create an added value to them, as a flow of confidence is generated with the client and this can make the client not go to the competition.

Order management plays an important role in optimizing the exchange of communications between company departments, which increasingly generate greater flow of information.

Electronic commerce (*e-commerce*), as a new business model, requires that logistics adapts its processes. Just as this kind of trade enables online order entry, it also requires treatment and response to those requests electronically, safely and effectively. In order to do so, the company must have powerful computer systems and organizational structures capable of proceeding in this new way. Computer systems provide fast processing of information and access to it, significantly reducing the activity times.

Thanks to this new business model, the concept of reverse logistics arises as well, a reverse flow that comes from customer and heads to the company appears, it is the case of returns management. The ease when making a return with a quick refund the amount of the product are fundamental in maintaining customer confidence and the costumer will purchase in the company again. When the customer knows how they can return a product without it becoming a complicated process, then, it will excellently facilitate their buying process.

In *Libro Blanco de Logística para Comercio Electrónico* (Casero et al., 2016) the causes of reverse logistics can be several:

- Returns: it occurs when the client receives an item he or she bought and returns it, either because the article does not meet the expectations it had created or because the size is not correct, for example. As Casero et al. notes (2016, p.73):

  In fact, the law allows, through the right of withdrawal, to return a particular item within 14 calendar days of receipt, without having to justify the cause of its return, entitled to reimbursement of the amounts paid for the returned item and shipping costs, but not those caused by the return.

- Items not ordered: this arises when preparing orders, picking errors are made and an item that the customer has not asked is included in the package. In this situation, the online store will be in charge of collecting the item not requested, and send the correct order as soon as possible, all without an additional cost, as it has been mistake of the company.

- Damaged items: it occurs by an improper packaging or improper handling of the products during the transportation process, so customers can receive their products damaged. In this situation, the client must inform the company within the withdrawal period for the company to replace the damaged item, at no additional cost to the customer. If the customer takes a long time to communicate the situation and the deadline has passed, the process proceeds to be enforced under the warranty.

- Items under warranty: it appears the product is under warranty from the manufacturer or distributor and it is not working properly. In this case, as long as the fault has not been caused by improper use of the product by the customer, the manufacturer or distributor will be in charge of all the expenses that this entails.

4.5. ICT solutions to the processes of logistics activity

Many companies need to store their products and are under pressure on reducing costs and inventories, these pressures are greater as time goes by. This leads many companies to seek new methods to make their warehouse operations more competitive than before. Currently, the structure and functions of the stores are subject to a process of change due to the speed of communications, the growth of electronic commerce and the presence of customers on the Internet.

The key to achieve competitive advantages and better results in warehouses are flexibility, speed, accuracy and immediacy of information, which can be easily obtained by using different technologies Automatic Identification and Data Capture (AIDC) combined with Warehouse Management Systems (WMS).

WMS offer the user a real-time view of the supply chain of a company, with the aim of improving its control, the process of decision making and customer service levels. Besides, other functions of these systems are the management of the main processes taking place in the warehouse of a company, such as, inventory management and control of the flow of goods from before their receipt until after their delivery.

The Warehouse Management Systems manage product locations and movements of workers and machines responsible for the maintenance of items.

On the other contrary, the WMS have two types of optimization mechanisms, one dedicated to optimize storage space, through a proper management of locations, and one that optimizes material movements, whether they are made by machines or people.

The introduction of ICT in warehouse management is a new way of working, faster and more effectively.

Once applied these types of systems, they result in a number of very representative results in companies:

- The productivity of the company increases, as equipment and staff are controlled in real time.
- Increased accuracy of the goods due to automatic identification.
- Reducing inventory levels and safety stock.
- Optimization of warehouse space, thanks to real-time control of inventory management.
- Improvements in the management and control tasks to facilitate planning and monitoring.
- Reduction of administrative work.
- Improvements in the level of customer service.

Moving on to something different, the activities carried out by these systems and how they are affected by the implementation of ICT will be explained.

According to the *Guía sobre las TIC en el sector de la logística y transporte en la pyme y la micro pyme* (CYBERSUDO, 2010), makes a distinction between three types of activity.

On the one hand, the receipt of goods, whose process is often slow because forms are still used in an extended way that must be filled manually or interpreted by humans, this is the case for example of the delivery notes. This traditional way of carrying out the process of receiving goods is a huge waste of time and effort. These errors, if undetected, can lead to problems in the final product supply, such as delays in delivery dates of orders agreed with the customer. And as a result of all what has been mentioned above, there is an image damage and loss of confidence in the company by the customer.

As stated *Guía sobre las TIC en el sector de la logística y transporte en la pyme y la micro pyme* (CYBERSUDO, 2010, p.13):

> *The processes of reception and location of goods in warehouses can be improved, importantly, by implementing automatic or semi-automatic data capture systems. Information obtained from these systems can be stored directly in the information management system.*

What is more, new technologies can also be used to improve other tasks performed within the warehouse of a company, such as identifying locations.

In this case, it is very important to know that a product has been received but it is also important to know where it is located in the warehouse. On many occasions, problems arise due to the fact that the products are stored in the wrong places or temporary placement assignments are forgotten.

As a solution to these problems, the *Guía sobre las TIC en el sector de la logística y transporte en la pyme y la micro pyme* (CYBERSUDO, 2010) proposes a system for

identifying locations, consisting of a number of teams able to identify, by a code, both goods and existing storage sites.

Once identified, the system would perform a test using real-time software, afterwards, the product would be placed in the right place. If the product is not placed in the right place, the staff in charge of the system would receive an alert notifying the error and the right place of that product.

To perform this process, warehouses must be properly structured and classified, and places to store the products must be clearly identified and located. There are several methods to identify and locate the products; however, the ones that are most commonly used are bar codes and smart RFID *(Radio Frequency Identification)* labels.

The barcode can quickly recognize an article in the logistics chain, in order to make an inventory when it is needed or know the characteristics of the product.

In contrast, RFID tags are small devices, similar to a sticker, that can be incorporated into a product. They contain antennae which allow them to receive and respond to requests through radio frequency from an RFID transmitter-receiver. The purpose of these tags is to transmit the identity of a product using radio waves.

With RFID technology all phases of the supply chain can be connected, from the production process to inventory and distribution, this system generates real-time information to speed up production, boost the traceability of products, improve service quality and streamline the delivery of customer orders. Thus, the management and operation costs (FUNDETEC, 2008) are reduced.

As far as the process of collecting material is concerned, called *picking*, the *Guía sobre las TIC en el sector de la logística y transporte en la pyme y la micro pyme* (CYBERSUDO, 2010) discusses the possibility of installing a special *software* in the company, so as to provide the person in charge of *picking* manually with a list with the working paths optimized, to thereby, achieve greater productivity and efficiency in the collection. Even in this software instant checks could be done in order to check whether the goods collected is correct or there is some error.

There are also two types of technology for the preparation of customer orders, they are called *Pick to light* and *Put to light*.

The *Pick to light* is a system that visually guides the worker to the exact location of the warehouse where the items are in a particular order. This system arose from the need to speed up the orders service and to reduce errors made by it.

The server provides commands to a set of visors associated with storage fixed positions, they are usually shelves. These viewers inform the worker about the items references that should be removed as well as about the quantity, therefore, helping to prepare the order.

The worker, in turn, must confirm the orders executed and viewers inform the management system about references removed in order to control the stock.

In contrast, the system *Put to light* helps the worker at the time of depositing items in the order in the collection of orders containers.

The previously explained systems have numerous advantages:

- Order picking in warehouse is done without paper.
- Fast order preparation, as there is a system of visible light LEDs.
- Significant increase in productivity.
- Quality improvement in orders preparation.
- Easy installation and maintenance.
- Easy to use.
- Inventory is controlled in real time.
- The composition of the final order is known through the management system.
- It is a suitable system for products of high and medium rotation.

Perhaps the downside is that these systems would be efficient only if they were big stores and with highly differentiated products.

Another very similar to the previous system is the *Pick to voice*. In this system mainframe data become spoken instructions to the worker, he or she carries a terminal that receives the spoken instructions from the central computer. The advantages of this system are the same as above in addition to the fact that this allows an acceleration in working processes, consequently improving the productivity of the company (FUNDETEC, 2008).

Inventory control is another activity that takes place in the logistics process, *the Guía sobre las TIC en el sector de la logística y transporte en la pyme y la micro pyme* (CYBERSUDO, 2010, p.14) defines it as:

> *Inventory control is simply to know and verify what you have and what you should have, where it is and where it should be, and finally, what is the most appropriate time to replenish.*

Inventory control is a procedure that tries to avoid situations of over-stock of products with low turnover, or lack of stocks when the company needs them. Using inventory control products management is kept organized, and it is tried to avoid the possibility of delays in delivery times or errors in the quantities of products already agreed.

The most common way to perform inventory control is by listing all inputs and outputs in the stock account in the warehouse. But for this to be effective, it is important that the company has a good system of data collection, both the number of products and locations.

The problem with this system is that it is very slow and laborious, apart from having a high degree of error. Therefore, the best solution is to use a system of smart tags. With RFID technology it is possible to identify and automatically capture data warehouse processes, eliminating the enormous sensitivity to errors and increasing the speed of the process, as tasks are reduced.

Another important process in the business is the relationship with customers. ICT has made it possible to manage more easily and efficiently all things related to the client.

That is the reason why the called CRM system (*Customer Relationship Management*), a strategy that brings together the processes and tools that enable companies to improve customer satisfaction and increase their revenues while reducing marketing costs due to greater customer loyalty. This system allows you to analyze, classify and anticipate customer needs.

When a company installs a CRM, all staff can establish a more fluid relationship with the customer and provide a more personalized service, producing an increase in satisfaction and brand loyalty.

The CRM allows you to track all interactions that the company has had with the customer, obtaining a history of incidents of he or she. Similarly, the organization immediately obtains information from its customers, making their relationship better by offering higher quality services and boosting corporate image.

According to the *Libro Blanco de las TIC en el sector transporte y logística* (FUNDETEC, 2008, p.65) "*in a CRM strategy 100% deployed there is only one record per client containing all information, providing a 360° view to everyone in the organization, regardless the area of the company where they work.*"

As far as the distribution system is concerned, ICT can improve thanks to so-called cross-docking, which is a distribution system in which the goods received in the distribution center are not stored, but they are prepared for their next shipment. Therefore, the period of storage of these goods is often nonexistent or limited.

By using very short time periods, from the moment when the goods are introduced in the store to their further output, it is necessary that companies use this system with a very accurate inbound and outbound shipment synchronization of products.

With this system, it is intended to eliminate the inventory that is not productive, and the benefits are felt by reducing storage time, by reducing the costs of transporting

products and by reducing stock levels. For these reasons, it also improves the flow of goods and the rotation of the products in the store.

Last but not least, as a summary, it is worth mentioning that the implementation of ICT in a company has a positive influence on the logistics management of it, increasing the level of service offered and strengthening their competitiveness in the market, but also meeting the needs of customers.

Before implementing these technologies, companies must assess what competitive strategy they want or which is the most suitable to their external and internal circumstances. In other words, what the situation of the sector is, what goals wants to achieve, or the position of competitors, for example. After these assessments, the organization knows what competitive strategy is going to work, and it decides what information and communications technology will be implemented in its logistics process in order to achieve those objectives it has set.

5. SIGNIFICANT EXAMPLES OF LEADERSHIP IN COSTS / DIFFERENTIATION IN LOGISTICS

Companies shown below allow to give a vision of how new technologies have been introduced into their logistics processes, and have resulted in improvements in the overall management of companies, thanks to the strategy of differentiation or cost leadership that they have decided to carry out, as well. We have focused on two companies, Ikea and Grupo Leche Pascual, well-known nationally and internationally. The first one belongs to the furniture sector and the second one, to the food sector, in particular the dairy products sector.

They are companies devoted to the manufacture and marketing of consumer goods, milk, a convenience good and a sporadic buying furniture product. These features are those that have helped us to analyzing its logistics system and to know what information and communication technologies are used to improve the process since the products reach stores until they reach the final consumer.

We have also opted for the case of a service, called GPS entel, applicable to fleet logistics companies and provided by the company Entel. Given the importance of the distribution and transport in logistics, it is interesting to know the functioning of this part of the process apart from the implementation of ICT at that stage.

Before dealing with the case of each of the chosen companies, it is useful to know the situation of each sector.

First and foremost, according to what the study *La industria del mueble en España, edición 2014* (AIDIMA, 2014) reveals, the Spanish furniture sector posted a turnover of 3,716 million euros in 2013, this along with other factors represents an upward trend, in other words, a change in trend.

This improvement is attributed to the good pace of exports, with a coverage rate of 83%, the best figure of the last decade representing more than 1,462 million euros in sales abroad.

According to the study of *La industria del mueble en España, edición 2014* (AIDIMA, 2014) this increase in exports is due to the specialization of manufacturers in new markets throughout the international area.

The study highlights that only 9% of manufacturers produce some part abroad, while 91% manufacture entirely in national territory, representing a relocation of production.

In 2014 the furniture industry achieved a turnover of 3,830 million euros, thus exceeding the decline that occurred until 2013 and a positive change of cycle starts. All these data together with the previously mentioned, confirm a recovery trend in the sector. Sales evolve favorably throughout the value chain of furniture, to put it differently, either suppliers of raw materials, companies engaged in the manufacture of furniture or dedicated to selling products businesses.

Sale expectations from furniture manufacturers until the end of 2015 were optimistic, but there are also challenges that the sector must achieve, such as, the growth initiated

by manufacturers of upholstered furniture that is still uneven between furniture sub-sectors or recovery about which it has been spoken earlier has not influenced the number of companies and employment in the sector.

Furthermore, with regard to exports, it is necessary to provide added value to the cabinet to reduce the image people have abroad about Spanish furniture, as there is the perception that Spain produces inexpensive furniture, compared, for example with Italy, associated with the design concept.

The changes that occur in the consumer in recent years also affect this sector, the furniture has lost importance in equipping homes because of the size of housing, which is smaller and the changes that are taking place in lifestyles, consequently, the furniture is becoming a more ephemeral element.

The telecommunications industry, as described by FUNCAS (2013, p.19 and 20) "*since the degree of implementation of ICT depends largely on the economic and social development of a country, it is interesting to know how Spain lies in relation to other neighbouring countries*."

According to a report by the International Telecommunication Union (ITU) in 2012, Spain is ranked number 28 among 155 countries included in the ranking and it is in the 19th position among European countries.

As FUNCAS states (2013, p.33) "*in recent years, large financial figures related to this sector have registered falls*".

Because the environment of economic crisis in Spain for some years, revenues from telecommunication services have decreased, as well as its weight on the gross domestic product (GDP) and employment. But it is not only due to the factor of the crisis, but the telecommunications sector in Spain is deflationary, so prices fall continuously due to the introduction of new competitors in the market and the strong regulation of its wholesale prices.

As it is pointed out in FUNCAS' conclusions (2013, p.33):

> *It is of concern the very low level of satisfaction of Spanish citizens in relation to the provision of all types of telecommunications services.*
>
> *There is a degree of uncertainty regarding the configuration of the new regulator called the Comisión Nacional de los Mercados y la Competencia (CMT)[1], National Commission Markets and Competition. CMT would disappear and the new commission would have broad regulatory powers over various strategic sectors. Some of the powers of the CMT would be transferred to government bodies and this could lead to a loss of independence.*
>
> *The telecommunications sector, in particular the development of advanced broadband networks, must be a key element of the growth engine of our economy. Although penetration rates of fixed and mobile communications have an adequate level, our penetration rates, considering the broadband access, it is slightly below the OECD[2] average. If the telecommunications sector, and a more extensive way the ICT sector, play the role of the engine previously mentioned, it must improve our provision of these infrastructures and encourage their efficient use. The Digital Agenda for Spain contains ambitious targets. Notwithstanding, the current environment raises questions about compliance.*

In the third place, the dairy products sector in Spain is going through a difficult situation for months, because of a war between producers, industry and distribution, which have made the price of milk sink and have caused harm to the survival of many livestock farms.

The largest declines in milk prices have occurred in the Baltic countries affected by the Russian freezing and in which a litre of raw milk moves around 20 cents, while Italy has a higher price at 33 cents per litre. The other major producing countries (Germany,

[1] CMT: Comisión del Mercado de las Telecomunicaciones.
[2] OCDE: Organización para la Cooperación y el Desarrollo Económicos.

France, the United Kingdom and the Netherlands) whose prices, as in Spain, are ranging between 28 and 30 cents per litre.

In this situation, the losers are farmers, due to the fact that they are forced to sell to industries well below the cost price.

After the end of the milk quotas, whose main objective was to limit public spending of the European Union and control the production of milk (as it existed Community overproduction of milk that caused an excess of this without being sold in the markets), and in order to stabilize prices and incomes of producers; many farmers have been affected.

As indicated by the *Libro blanco de las TIC en el sector agroalimentario, subsector lácteo* (FUNDETEC, 2011), the main part of the country dairy products production, focuses on the Cantabrian coast, highlighting Galicia over the rest of communities.

With regard to the production and its evolution, it is expected a further increase in production this year in the European Union.

After all these previous explanations, you must know specifically the use of new technologies in logistics processes of the following companies:

5.1.Ikea

In this section we will see some examples of companies, one of them is Ikea, which uses the strategy of cost leadership and differentiation throughout its logistics process.

As it has been pointed out by Regidor (2011, p.1):

> *Ikea is best known furniture store in the world. Its history started in 1943 in the forests of southern Sweden, when founder Ingvar Kamprad started selling*

matches to neighbors at the age of 17 years old. He realized that by buying wholesale and selling them at low prices, he made a profit.

Ingvar's father gave him some money for being a good student and he assigned it to set up his own business. In 1946 Ikea sold pens, wallets, picture frames, mats for tables, watches, jewelery and nylon stockings.

The name and colors of Ikea are not a coincidence. The name is formed by the initials of its founder (IK) plus the first letters of Elmtaryd (E) and Agunnaryd (A), the farm and village where he grew up, and the colors are those of the Swedish flag.

The furniture did not appear until 1948. It was made by the manufacturers in the area and had a great reception, so he began to sell furniture on a larger scale using a catalog from the year 1951. Then he realized that with the success of the first piece of furniture sold through the catalog, that their future was to become only in a furniture dealer.

The IKEA concept, just as we know it today, began in 1953, when the first furniture exhibition opened in Älmhult (Sweden).

One of the main reasons for the success of Ikea is that it has reached to have the control of the entire value chain, from product development and production to facilities of retail sale. With its supply chain, Ikea creates a large part of their price competitiveness and profitability. After several changes in purchasing policy, it was in the nineties when the company decided to work on a new strategy, which was moving production to new Asian countries where the cost was low, reducing the number of suppliers, focusing strongly on reducing prices, and start production owned by Ikea with the acquisition of the company *Swedwood*.

There are currently many suppliers whose production for Ikea is one hundred percent, this causes some dangers but the benefits are many. The advantage is not only to have greater purchasing volume and lower prices but also to achieve efficiency in logistics, freight transport, productivity and quality control.

The development of the supply chain of Ikea from the sixties to the present time, consists of important and crucial movements to be able to achieve great advantages, such as the transfer in the sixties to Poland and in the nineties to Asia, the introduction of their own production (*Swedwood)*, and a supply chain oriented to the process to decide how to improve conditions with suppliers currently.

One strategy has managed the company to carry out is through the logistics organization, reducing movement and handling the products in the store.

The second strategy that Ikea carries out is to integrate more the customer in the sales process, to say it in other words, Ikea has introduced the self checkout lanes, through which customers, once they have made their purchase, scan barcodes of products and pay by credit card their own purchases. To carry out all this process, there is always a staff member of the company making sure that everything is done correctly.

Another strategy of Ikea is to manage store staff, for instance, to control variation staff having a minimum of 40% or 50% of full-time workers (Dahlvig, 2012).

The fourth strategy used by this company is benchmarking, to run the store performance. In order to do this, several Ikea stores, by taking into account the key index performance, that is to say, sales or productivity are compared, as well as the measurement of service is compared.

On the other hand, the characteristics of differentiation of Ikea are several, in terms of design, the company offers a modern Scandinavian style furniture compared to the traditional design. Its target audience are families with children, the stores have a large size and offer everything for the home at the same point. In addition to the previous ideas, it is located at the outskirts of cities and provides a free parking service. It even introduces the concept of self-service and flat pack furniture self assembly by the customer.

Once the costumer has seen the exhibition of furniture and decided the furniture they want to buy, the route of visiting the store leads the customer to the store, there the client searches the location where the furniture they want and load it to their shopping trolley, in case they need help to load the furniture, the client can request it to store personnel.

After that, the customer can go to the normal checkout or to the self checkout, in the latter it is the customer who scans the bar codes of the products purchased and proceeds to subsequent payment.

In this way, Ikea has managed to differentiate itself from competitors and revolutionize the conventional business model. From that point, the company has created a unique and distinct brand. What is more, the company offers a number of competitive advantages for the customer, as it presents an integrated production, product development adapted to suppliers, global supply and integration of the customer in the selection process, distribution and assembly of the products.

One of the key issues to success of this company are its low prices, based on its policy of saving costs. A study with flat pack furniture was carried out, when one of the first employees of Ikea removed the legs of a particular model table with the aim that after it could fit in the car to transport it home. This allowed the company to achieve this end, but also managed to fill distribution trucks of company with more products and lower costs in all production processes, to finally achieve transfer this cost reduction in savings in selling prices as well. As a consequence, flat packs and self-assembly are the key concepts of Ikea (Regidor, 2011).

The brand is associated with a unique and distinct profile, the Scandinavian one. Even the store showrooms or catalogs provide customers with the inspiration, ideas and complete solutions when deciding on the purchase process and the product assembly. Ikea tries to create something more than just a simple store, and it is the fact of creating a shopping experience through the room balls for children, the restaurant and different activities, which are another of the peculiarities of these macro furniture stores.

All these things, combined with a good price value compared with the competition, is what is the key to success of Ikea (Dahlvig, 2012).

5.2.Entel GPS

Another example discussed above is the case of Entel GPS service provided by the company Entel SA, a telecommunications company founded in Chile and present in Peru. Entel is one of the largest telecommunications providers in Chile, whose differentiated quality services include mobile, wired, IT outsourcing and contact center communications.

The creation of the national telecommunications company (Entel) dates back to the year 1964, following the earthquake that occurred in Chile in 1960 and damaged the intercity network. It was created as a public entity until 1986, when the Chilean government privatized it.

For thirty years, Entel was the main provider of long-distance telephony in Chile. In 1994, the national telecommunications market was reformed and new operators entered, which increased competition. In this situation, Entel maintained a strong position in long distance and was successfully introduced in other high-growth markets in the country, such as mobile telephony, and focused on providing services related to integrated solutions for voice, data and Internet services, and also in those related to information technology.

The company has reformulated its business to participate in highly competitive markets, basing its strategy on three criteria: high quality of service, infrastructure and innovation.

Entel GPS is an application that can be used from any computer connected to the Internet or via mobile phone at the Wap Entel portal. It is that from a web address you can control and manage the company vehicles. The service is based on a GPS / GSM / GPRS device inside the vehicle, and its location is transmitted to a central server, whose information is available in high quality maps online.

This application enables important controls in the logistics fleet, such as speed monitoring or detentions made in route, to know the exact location of the vehicles or the route that makes each component of the fleet. It also incorporates alarms sent via email or SMS. In addition, there is the possibility of installing sensors and accessories that offer more control, for instance, temperature sensors if products need to maintain a cold chain transport.

Entel GPS allows transport companies to better plan their routes and control that they are met, therefore, the working hours are optimized and extra costs are avoided, enabling companies to increase their productivity. It is for this reason and the ones we will see later, why it is a clear example of cost leadership strategy.

The benefits of this service are several, on the one hand, it helps to reduce fuel costs and optimize its use since it determines maximum speeds, either in general or area, it also selects routes so that deviations and unauthorized stops are eliminated.

On the other hand, it also offers greater security to the fleet, reducing the likelihood of accidents as this application notifies drivers of danger zones and controls excessive speed.

Finally, Entel GPS helps to reduce delivery times and possible delays due to accidents, even customers are informed at all times of the location of their loads, so the complaints rate decreases and compliance with customers occurs regarding the agreed time delivery, achieving improved service quality and increased efficiency and productivity of the company.

This system also helps the distribution of work, as it confirms the work done, in other words, days, hours and permanence in the workplace.

Companies that decide to incorporate this system they will, given the importance of its activity to carry out monitoring of freight transport.

This is a significant example of fleet management technologies and traceability in transport, which are used for the location and status of the fleet, and as we have previously discussed the route planning system.

With this latest tool the most optimal routes for the company are calculated taking into account the drivers and vehicles available, driver's fees, vehicle capacity, preferred and maximum duration of route, warehouses and distribution centers, knowledge of traffic at rush hour, addresses and directions of traffic, speed limits, place where the customer is, etc.

5.3. Grupo Leche Pascual

Grupo Leche Pascual is another clear example of cost leadership strategy and differentiation. It is a Spanish business group dedicated to the preparation and packaging of milk and dairy products, but also of other food products such as yogurts, juices, soft drinks, cereals, liquid eggs, tortillas, mineral water and soy drinks.

The company was founded in 1969 by Tomás Pascual and since then the business has been run by his family. The headquarters is located in Aranda de Duero (Burgos). In the same year, a group of businessmen, Tomas Pascual's brothers, decided to be in charge of a dairy cooperative that was bankrupt in Aranda de Duero. Tomás named it Industrias Lácteas Pascual. It was in 1973 when the company entered the Spanish market thanks to the packaging in *tetra brick*, which was a pioneer in Spain, and the process of ultra pasteurization, which was used to preserve milk longer.

In 1974, the company could commercialize the mineral water *Bezoya* and in 1987 it started producing fruit juices under the brand *Zumosol*. Two years later, Grupo Leche Pascual re-built its factory to produce dairy products like butter and cream, but it was in 1990 when Pascual became the leader of the Spanish dairy market.

Since 1997 the company began to innovate marketing milk and juice drink, called *Biofrutas* they produced a liquid yogurt called *Yosport* and in 2002 they began marketing the line of soy products (*Vivesoy*).

Currently, the group has 22 industrial plants and is present in 88 countries on four continents, but the main sales markets are Spain and some countries in South America.

Among the various brands marketed, in some cases leaders in the markets where it operates, the main product is milk Pascual.

According FUNDETEC (2008, p.86):

> *One of the most distinguishing characteristics of Grupo Leche Pascual is its powerful logistics infrastructure with great distribution capability, which allows it to reach directly to large market segments.*
>
> *In addition, the company has its first experiences in the field of RFID (Radio Frequency Identification) as it implemented this technology in its facilities for traceability in the area of the eggshell. The purpose was traceability and optimization of processes from the warehouse to the customer, for instance, shipping logistics and distribution.*

The implementation of RFID technology in the company assumed some benefits, it improved the image of Pascual brand as increased sales volume, it also increased customer satisfaction by reducing errors, or increased traceability to the customer thanks to this technology and the use of mobile devices by carriers, it ensured greater safety and better quality products, as well. Similarly, administrative costs were reduced because the RFID technology immediately assumed a significant reduction in errors and returns.

In this sector, it is very important product traceability from livestock production to distribution to customers. According to the *Libro blanco de las TIC en el sector agroalimentario, subsector lácteo* (FUNDETEC, 2011) each phase of the milk production process, has some main needs that require the implementation and the use of specific technologies.

As stated by el libro blanco cited above, the production process of milk is divided into several phases: livestock production and processing industry. But a key factor in this process is logistics.

As for livestock production, ICTs are really important because they are responsible for managing and controlling the quality of milk. This involves the management and control of the quality of livestock, such as collection and analysis phase before the milk enters the next process, which is transformation. New technologies streamline the exchange of information between livestock production and the transformation process, but they also help companies to manage purchases and sales and the relationship with suppliers as well as to understand and manage traceability and product quality.

The most important technological solutions in this phase are the tools RFID, microchips and barcodes.

If we move to the phase of milk processing, control systems using sensors and automated systems processing operations provide essential information on product traceability and the status of milk at all times.

Logistics, as mentioned above, is a key factor in the production process of the dairy sector, since according to the *Libro blanco de las TIC en el sector agroalimentario, subsector lácteo* (FUNDETEC, 2011), the cold chain must be secured both in milk collection and distribution and temporary storage of most dairy products.

In order to carry out the logistics, the dairy companies use technologies warehouse management, for example, the so-called WMS (warehouse management system) to manage the stock, orders and accurate storage with real-time availability.

In general, information and communication technologies help dairy companies to improve their strengths, such as high quality of dairy products, to give value to quality, optimize investments in infrastructure and innovation, etc.; all this, facing threats to the sector (current crisis, adaptation to the reform of the Common Agricultural Policy). It

also allows companies to gain greater market position and be competitive to seize the opportunities that are offered to the sector, in other words, new forms of consumption, new markets, and so on; all through cost optimization and search for business excellence.

For all these results discussed above, we can say that ICT implanted in Grupo Leche Pascual show a clear cost leadership strategy and differentiation that has helped the company to compete in the dairy market.

After analyzing and learn more about these three examples, it is interesting to compare them. Although each of the companies belong to a different sector, there are some similarities, as in the case of the service, GPS Entel and Grupo Leche Pascual products traceability is very important because it allows the location in which the product is at all times and the production phase in which milk is.

Furthermore, cost savings through ICT is common in the previous three examples, in the case of Ikea, it is associated with flat packages of products because it allows the customers to transport their products purchased home or it allows the company to transport them to the customer's home, but being flat packages, vans or delivery trucks need more packages to be filled, so that the transport in the company becomes a really efficient service.

As for the service GPS Entel, the cost savings is associated with control of the entire process of freight transportation, for instance, the choice of routes to avoid detours, to the optimization of working hours, to increased security that occurs due to the introduction of ICT, reducing the likelihood of accidents and fuel costs.

In Grupo Leche Pascual savings also take place in costs through RFID technology, providing the traceability of all products of the company and as a consequence, errors and returns decline, as customers know all the information about the product, either its characteristics or its movement throughout the supply chain.

On the other hand, differences in the above examples are that after the implementation of ICT in Entel GPS service, the company has a competitive advantage over the

market, the so-called cost leadership. However, Ikea and Grupo Leche Pascual, have managed to differentiate themselves from competition and achieve cost leadership, thanks to the implementation of ICT in their logistics processes. Perhaps this is because Ikea and Leche Pascual have a much more direct competition than GPS Entel, and this is one reason why they decide to differentiate the market through the introduction of new technologies in their supply chains.

6. CONCLUSIONS

To summarize, logistics management is a strategy for businesses, because it improves competition and achieve improvements in the profitability of the them. Thanks to the introduction of new information and communication technology (ICT), logistics management becomes integrated into the overall management of the company, resulting in a flow of information between different processes and actors involved in the supply chain.

The introduction of ICT and the intense technological revolution, have created a new competitive environment, based on the globalization of the economy and strong competition. Given this environment, companies must face to survive in their sectors, because it affects their value chain. Therefore, organizations must redesign their processes, learn to use ICT and investments both tangible and intangible, to adapt to this new situation.

According to the *Análisis sectorial de implantación de las TIC en la pyme española* (FUNDETEC, 2010), the logistics sector is considered as one of the leading sectors from a technological point of view, since it has a high penetration of ICT solutions.

When ICTs are introduced in logistics, we have studied that they produce many positive changes in companies as it improves the management, control and monitoring of goods in warehouses. Business efficiency is increased and errors are reduced. Resource consumption is also reduced and it becomes more sustainable in procurement processes and distribution, for instance, ICT is used for the capacity of a company car, the number of kilometers traveled decreases when making the delivery of an order or the work of a group of carriers is better coordinated.

But not only has a positive impact on logistics activities, as we have seen, it also positively affects relations between the company and the customer, with the development of ICT, a better response to customer needs is given, and ICT improve flexibility and speed of response. Companies are able to meet the needs of their customers and to create a relationship of trust between them, so the client remains loyal to the company and satisfied with the service provided.

We have also analyzed that when a company introduces a new technology in their logistics process, it allows them to achieve a strategy of cost leadership or differentiation, that is, it provides a *competitive strategy* to survive in the market where the company operates, giving a higher level of response to market needs. It also reveals, as mentioned before, the traceability of products, a very important concept in the supply chain because if there is a problem, having identified the process by which the product runs over all chain, it is possible to detect errors and to know where the fault is, fix it and provide a more streamlined service level to customers, obtaining accuracy and safety in the supply chain about the characteristics and movements of each product.

The study and analysis of the subject of this work has enabled us to meet several ICT solutions and the benefits they bring to the logistics business processes so that companies depending on their situation in the sector, use a solution or another to get a competitive strategy in the market, that is being apart from the competition or being leader in costs.

For this reason, we have learned that the introduction of ICT solutions in companies logistics is a very important factor to be successful and keep loyal customers with company.

Perhaps the Spanish SMEs need some help when implementing ICT solutions to their logistics processes. Due to this fact, some points to improve arise. According to the *Análisis sectorial de implantación de las TIC en la pyme española* (FUNDETEC, 2010), in an environment in economic crisis, incentives and support to the implementation of ICT solutions in the sector have almost disappeared. Given the importance of ICT for efficient management of the distribution of goods, the need for support the companies in this area by the Public Administration is suggested.

On the contrary, although the lack of training when implementing these technologies has not been very important, it is suggested the opportunity for public administrations to continue to support the professional training of employees in the logistics sector, both functionally and technologically. In addition to suggesting to all companies the choice of a key option for their business, the implementation of ICT solutions in their logistics processes. This can be accomplished by providing the necessary information to publicize the new ICTs and the advantages and improvements that occur at different stages of the logistics process.

In conclusion, the INSTITUTO TECNOLÓGICO DE ARAGÓN (2016) offers a future line of research with the aim of creating knowledge in the development of systems that support future technological solutions in terms of production processes, transport operations and distribution, simulation and logistics management processes and management of the supply chain. This researh line main goal is accomplish the objectives that the European Union has set for 2020, such as achieving efficient systems resources and environmental sustainability.

Horizonte 2020 is a program of research and innovation of the European Union which started running in 2014 and will take place until 2020. The main pillars of this project are to address the social challenges that exist today, for instance, the importance that citizens give to health and food security in our lives. In the field of logistics it is also important to use intelligent systems and ecological transport, thereby contributing to climate and the environment, which is increasingly more damaged. Similarly, another social challenge companies face is resource efficiency and raw materials needed to carry out production processes.

Other important pillars are promoting industrial leadership in Europe, in other words, providing support in terms of research, development and demonstration in the fields of information and communication technologies, nanotechnology, advanced materials, biotechnology, advanced manufacturing and processing and space, with the aim of empowering users of all these areas and in all industries and services sectors where these technologies are used. It is also offering support for small and medium enterprises, in order to offer potential to grow and internationalize.

To strengthen European excellence in basic science is another important pillar. Programa Horizonte 2020 aims to raise this excellence offering quality research to ensure long-term competitiveness of Europe. Therefore, the objectives of this program include the need to support creative and talented people to carry out cutting-edge research of high quality, based on the success of the European Research Council (ERC). It is also important to provide researchers training based on excellence and good development opportunities through the *Marie Sklodowska-Curie actions (MSCA).*

Another objective of this project is to fund collaborative research to develop new fields of research and innovation.

To meet the challenges discussed above, this research will try to reduce resource consumption by optimizing operations and internal logistics flows (*intra-factory logistics*) in production processes and distribution centers. So it will be worked with intelligent multimodal routes computing systems to take advantage of available information sources and encourage mobility of people and goods in a sustainable way with the environment. In addition to the time of establishing transport and logistics solutions, this research will integrate the calculation of the carbon footprint of companies to measure and reduce its impact on climate.

Limitations or obstacles that we may encounter when establishing ICT solutions in logistics processes, are associated with *electronic commerce*, since it is a special case in which the wishes of the customers are served more carefully than in a traditional setting, and as there is not a physical store, it requires an added effort by the seller.

Similarly, the storage process in the case of *electronic commerce* is different because its logistics is based on zero stock, that is to say, the called *just in time*. In this trade, the seller must achieve scalability and total availability to meet the needs of its customers, having a delivery system flexible enough to adapt to the sales excesses reaching in its market and at the lowest possible cost to the customer.

Moreover regarding *reverse logistics,* explained in previous sections, in *electronic commerce* it is very important, because if a customer makes a purchase online and returns the items purchased, the costs associated with it are assumed by the seller.

Therefore, as the OBSERVATORIO REGIONAL DE LA SOCIEDAD DE INFORMACIÓN (2016) explains, it must devise *"a comprehensive and effective system of verification, collection, sorting and redistribution of these assets to optimize them to the maximum and minimize the costs associated with this process."*

Having analyzed and studied this issue, conducting further research to learn how they impact the new information and communications technology in employment is pending, which would be interesting to analyze the consequences and the changes that will occur in the future work environment.

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